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Using Electronic Meeting Software for Army Exercises

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Abstract

This report describes the use of an electronic meeting software system by the U.S. Army Research Laboratory (ARL) to assist the Information Systems Command (ISC) in three Grecian Firebolt exercises in February and June 1996.

This use of the electronic meeting software was valuable to the exercise leader in preplanning, execution, and after-action reporting for the exercises and to the ISC staff in the staff exercise supporting Grecian Firebolt. In this latter use, the electronic meeting software was an inexpensive, simple, and effective way of analyzing staff and organizational interactions.

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1. Introduction

This report describes the use of an electronic meeting software system by the U.S. Army Research Laboratory (ARL) to assist the Information Systems Command (ISC) in three of the Grecian Firebolt exercises. ISC conducted the exercises in February and June 1996 in a secure facility at Fort Huachuca, AZ. Two of the exercises dealt with network laydown issues, and one was a staff war game for the ISC staff.

The electronic meeting software system enables a group to collaborate more effectively in a group activity. It provides tools for brainstorming, group writing, and consensus exploration and development (voting). In the map exercises, the participants used the electronic meeting system primarily as a group writing tool to document their accomplishments and the additional needed tasks. In the staff exercise, the participants used the electronic meeting software systems to record required actions and tasks to support a specific war game scenario. The participants then matched these actions and tasks back to the organizational mission essential task lists (METLs) at the directorate level. In the final step, the participants matched the directorate level METLs back to the command METLs.

Grecian Firebolt is a series of worldwide communications exercises designed to develop skills in establishing, operating, and maintaining communications networks in a mobile, combat environment. The two Grecian Firebolt network laydown exercises dealt with identifying and documenting specific network connectivity requirements (hence—network laydown). The middle exercise was an ISC staff exercise, which dealt with validating newly established METLs and subsequent battle tasks supporting those METLs for all ISC directorates. The ISC staff members also practiced their staff interactions during the staff exercise and learned more about how their directorates' responsibilities fit into the big picture.

1.1 Network Exercises. Both network exercises used the electronic meeting software to document the actions and plans. Because the exercise leadership had more experience with the

electronic meeting software in the second network exercise, the breakout teams made more diverse uses of the electronic meeting system in that exercise.

1.2 Staff War Game Exercise. ISC's primary objectives in the Grecian Firebolt Operations Plan Staff Exercise were:

- Validate METLs and subsequent battle tasks for all ISC directorates.

- Exercise staff interaction.

According to both participants and game controllers, the exercise identified needed changes to some directorate METLs and battle tasks. The exercise also validated the existing ISC METLs as relatively sound for a major regional conflict scenario. The staff exercise also illustrated to the participants what other directorates would do in times of conflict and how their own directorate fit into the big picture. The staff exercise made clear the amount of interaction required and the detail of the interaction needed to accomplish specific tasks.

1.3 Research Objectives. ARL used the exercises to:

- Support the ISC staff under the existing Technical Program Annexes for research support.

- Demonstrate an innovative and new use for an electronic meeting system in an actual operational exercise, in addition to preplanning activities and after-action reports (AARs).

- Identify additional research topics in collaborative systems.

Using the electronic meeting software system to support the staff exercise was deemed a success from several perspectives:

- The exercise demonstrated productivity improvements from using electronic meeting software systems. Feedback from the participants indicated they felt that this exercise would have taken four–five times longer if run in a more traditional fashion.

- It showed the feasibility of using electronic meeting software systems to actually run certain types of exercises and gaming situations.

- It identified additional opportunities for use of electronic meeting software.

- It allowed the staff to express ideas and actions that would have been difficult to bring up in any other circumstance.

1.4 Conclusions. This use of electronic meeting software showed it to be a useful and valuable tool for these exercises for preplanning, execution, and after-action reporting. The authors recommend the electronic meeting software be considered for use in other exercises. The use of electronic meeting software for gaming of a staff war game was a relatively inexpensive, simple, and effective way of analyzing staff and organizational interactions. With the forthcoming ability to operate this electronic meeting software system over distributed environments, this software has large potential for other gaming situations, organizational analysis, and work flow simulation—both military and commercial.

2. Background

The University of Arizona developed this electronic meeting software, often called Group Decision Software Support (GDSS) or Electronic Meeting Software (EMS), from research done in the 1980s. The typical usage is for face-to-face meetings. Each individual has a work station connected to a local area network. The software allows for simultaneous and anonymous input of material by the group. The basic activities include idea generation, commenting, categorization, prioritization, and group writing. Meetings usually involve a technographer to run the mechanics

of the software and a facilitator to orchestrate the meeting. Industry studies have shown an overall productivity improvement of four to one through improved quality of information, increased quantity of information, or decreased time of the meeting. The following sections provide background on the use of this software within the Grecian Firebolt exercises.

2.1 Relationship With ARL. ARL has had a significant research program in electronic meeting technology since its inception in the early 1980s and continues to conduct research in this area. ISC has formal agreements for research with ARL called "Technical Program Annexes (TPAs)." Under the current TPAs, ARL provides electronic meeting support to ISC elements to demonstrate electronic meeting technology and to determine requirements for future research.

During June 1995, ARL representatives from Atlanta visited Grecian Firebolt 1995 to see where ARL could be of service to future exercises. Subsequent discussions revealed a possible use of electronic meeting technology for preplanning and AARs. ARL had used the technology in this manner previously but also desired to use the software within actual exercises.

Continued discussions with the Grecian Firebolt exercise management team revealed that they planned a precursor exercise for February 1996. The first week consisted of a network or map exercise, and the second week was a staff or gaming exercise. The network exercise used the electronic meeting system as a group documenting tool and to generate the AAR. The staff exercise used electronic meeting technology for several activities, including the actual running of the game.

Key Point: Management interactions and buy-in were critical, both in the initial discussions and for later commitments of resources.

2.2 Planning for Usage. Planning for the exercise began in November 1995. Our participation consisted of discussions with the Grecian Firebolt exercise management on their desires for the exercise and on the types and amounts of needed equipment and personnel. The discussions generated dialogs with ARL personnel experienced in electronic meetings concerning what actually could be accomplished. Coincidentally, a portable electronic meeting system was going to be in Fort Huachuca in January. This allowed for a half-day preplanning meeting and exposed some of the

potential participants of the exercise to the electronic meeting system and allowed for ideas and feedback.

Key Point: Although we did not use the system extensively for exercise planning, we did show, that with proper organization, it could be used in exercise planning as well.

2.3 Infrastructure Support. The basic setup consisted of a secure local area network with 12 stations, 1 server, and a printer. The first setup took longer, as we installed both the removable hard drives and the windows NT operating system software for the network. This took approximately three individuals part-time over 4 days to set up the network. The second setup took approximately 1½ days.

2.4 Roles. The following describe the general roles and responsibilities among all three exercises.

- **Management.** The ISC, Deputy Chief of Staff for Operations and Plans (DCSOPS), and the 311th Signal Command provided management. This management included exercise planning, scenario development, instructional materials, security, and general administration. Several ISC reservists, officers, and noncommissioned officers (NCOs) provided the exercise management.

- **Leader.** This was the individual who provided on-site leadership and direction for the exercise. The individual was also part of exercise management.

- **Controllers.** These were aides for the exercise leader who provided interventions during the scenarios to stimulate further action. The controllers were also sometimes known as the red team.

- **Participants.** Participants included both managers and action officers from the ISC staff along with soldiers from the 311th Signal Command for the network exercises.

- **System Administration.** The ISC HQ Commandant provided system administration support as needed several times during the exercises to solve various problems. Although the February meeting had several problems, the June installation was extremely stable.

- **Electronic Meeting Facilitation.** ARL and the ISC liaison to ARL provided electronic meeting facilitation. This facilitation consisted of running the electronic meeting software and the development of the methodology of game play.

Key Point: The use of the electronic meeting software system was only a success because of the willingness of the participants to try something new and to be flexible when changes were required.

2.5 Group Systems for Windows Tools. Group Systems for Windows has several different tools, some of which were used in these exercises. The tools used in these exercises were Topic Commenter, Categorizer, Group Outliner, and Vote. Topic Commentor and Categorizer are tools designed to collect new information. In Topic Commentor, participants are given a specific set of topics on which to comment. In Categorizer, typical use consists of the facilitators providing an open question to stimulate comments, a period of time for participants to respond with their ideas, a second period to consolidate these ideas by eliminating duplicates, and a third period to group these ideas according to the interests of the participants and meeting owner. Group Outliner is an even more structured way of collecting comments than is Topic Commentor in that multiple levels of detail can be collected. Group Outliner is often used for a group to write a draft of a document to record what the group has accomplished. Also used in these exercises was the Voting tool. This tool provides several different ways of identifying consensus (or lack of consensus). Voting methods include rank ordering, rating on a 1 to x scale, agree/disagree (both four-point and five-point scales), yes/no, true/false, and multiple choice. The voting tool may also be used to develop consensus.

2.6 The Electronic Meeting System Provides for Anonymity of Input, Parallel Input, and an In-Box Exercise. In March 1996, the ISC liaison briefed the staff war game to ARL researchers interested in uses of electronic meeting software. At that time, ARL researchers remarked on similarities to an experimental leadership course several years ago that used a similar device, called

the "In-Box Exercise." In the In-Box Exercise, course directors gave lieutenants the role of a company commander. The course director asked the lieutenants to respond to materials placed in the "in-box" with buck slips for delegation and actions. The exercise required of the lieutenants a knowledge of who is responsible for what actions under given circumstances—very similar to skills exercised during the staff war game.

The electronic meeting system provided anonymity of input, parallel input, and the means to express consensus (or lack thereof) on specific topics.

3. Network Exercises

The first network exercise (MAPEX) was 12–16 February, and the second network exercise (WAREX) was in June 1996. The purpose of the network exercises was to practice the Army response to a major regional conflict in the Pacific and to identify required improvements in that response for the organizations involved in the exercises. Participants included the senior military planners from the Delaware National Guard (311th Signal Command), U.S. Army Reserve (USAR), and ISC counterparts. ISC planned to use the results of these sessions in the actual Grecian Firebolt 96 in June and for operational planning.

3.1 Primary Use of the Electronic Meeting System. During the network exercises, the principal electronic meeting system tool in use was Group Outliner. This enabled the exercise planners to prepare an outline structure to record the information they wanted from the exercise. This outline could be updated at will as additional topics of interest were discovered. The electronic meeting system allowed for simultaneous input from any of the 12 stations as needed. The network exercises consisted of units marking various communications links on the maps and documenting which units had which equipment and when those systems and units would be deployed. All personnel had access to all machines and were free to enter data as needed. Several individuals used the "import" facility to import text files previously developed.

Key Point: Meeting planners need to prepare imported meeting material carefully in order to make it easily usable by the group within the electronic meeting environment for subsequent commenting.

Participants also used the system to post questions and obtain answers. During the exercise, participants generated approximately three pages of questions that could not be answered by the existing participants. To solve this, exercise leaders invited elements of the entire command into the room during the week, showed them how to use the system, and invited them to answer the unresolved questions.

Key Point: With proper communications and planning, questions like these could be made available to participants accessing the system in a remote or distributed manner.

3.2 Layout. In the original plan, the network and electronic meeting software were to be set up and tested on 9 February but not used until 16 February for the AAR. Plans changed. Exercise leaders decided to use the technology during the entire time as a data capture device. This change in plans caused considerable confusion about the network configuration as exercise participants had placed very large maps on most of the table space. The configuration for June accommodated both the maps and the machines by using a larger facility.

Key Point: When using the technology for consecutive multiple exercises, facilitators must take care to understand the physical laydown needed in each exercise and, if possible, develop one configuration for all exercises.

3.3 After-Action Report Usage. Although some parts of the working outline were used for the AAR, the actual meat of the report was collected in a 45-min brainstorming session using the Categorizer tool from the electronic meeting system. This session produced eight pages of information that were distilled into the AAR. The AAR was completed and briefed the afternoon of the completion of the exercise.

3.4 Other Uses. During the second network exercise, session planners set more time aside to teach participants how to use the electronic meeting system. Session facilitators held a brainstorming session on participant expectations for the exercise to teach the basic uses of the system. Although team leaders used this material in the collective outline, they later agreed that better input could have been collected by focusing the group on specific issues. Further, as team leaders became more comfortable with the electronic meeting system, they used it for brainstorming team issues and voting.

3.5 Value Added. All participants felt that the system was of value, and several participants requested information on how to obtain this technology for their units. The exercise management stated later:

> *"Meetings of this sort would otherwise take much more time and cost a great deal more. We focused on exchanging information electronically, yet were able to retain the personal contact needed for a real team effort."*

Overall, the system enabled internal coordination through the use of the prepared outline. The system also enabled development of consensus among the work groups as they were able to continuously share the information as they developed it. The document resulting from the exercise evolved over time. The final document consisted of both requirements and equipment sections. By the end of the exercise, over 40 pages of working notes for changes to an operational plan were produced.

4. Staff Exercise War Game

The Staff War Game was 20–23 February. The use of the electronic meeting software for the actual war game was the most unusual use of this technology during these exercises. However, it was only one part. There were several smaller activities, both before and after the war game, that

allowed participants to get the most out of their war game data. The basic staff exercise had these primary objectives:

- Validate METLs and subsequent battle tasks for all ISC directorates.

- Exercise staff interaction.

4.1 Premeeting Activities. The primary planning for the game consisted of game methodology development by the facilitator team and scenario creation by the reservists, and then subsequent play-testing. In total, four individuals worked part time for about 1 week.

4.2 Directorate Level METL Review. An METL is a list of all tasks that a unit must be able to do in order to accomplish its assigned mission. The first activity consisted of loading all the directorate level METLs into an activity called "Categorizer" and having the group review their own METLs and then comment on everyone else's. This took the majority of the first half-day. In addition to METLs, exercise planners asked the participants to bring their supporting "battle tasks." These "battle tasks" are more specific than the mission essential tasks and have conditions and standards.

Most battle tasks are of the variety: "put on gas mask" or "clean and fire weapons." The areas of system engineering and staff work do not have crisp tasks such as these that are easily definable and repeatable. Participants thus found developing staff battle tasks new and difficult to do. This was one area where the game method assisted the participants.

4.3 Actual War Game. The actual war game began in the afternoon of the first day and lasted until noon on the third day. Exercise leaders provided each staff organization one work station and encouraged participants to have other persons from their directorates assist. Some of the smaller

directorates only had part-time participants and shared work stations with others. Some of the more involved directorates had two–three individuals in their "battle command" at all times.

4.3.1 Basic Play. Once the controllers handed out the scenario, the participants had approximately ½ day to react to the events by creating scenario tasks. Some of these tasks were identical to previously made battle tasks, and some were more detailed. For the purposes of the game, the controllers were interested in only what people were doing. After the game, exercise leaders asked participants to decide if the activities during the game formed into some generic "battle tasks." Due to security considerations, we modified actual activities to illustrate a typical scenario task for Scenario 1 (Figure 1).

The first block was the main header of the task. By clicking on the header, the participants could see the detail underneath the task (second block). Exercise facilitators asked directorates to enter their tasks with their ID, followed by a short header for the task and then list the other directorates who needed to participate in completing the task. As the game progressed, facilitators required the directorates to monitor the list of tasks and then respond on the detail sheet with their action. The numbers after the comments were identifiers inserted by the system. Facilitators directed participants to use the identifiers to reference their remarks.

4.3.2 Controllers. The controllers were not looking for accuracy, but just to see that the participants created reasonable tasks for the life of the scenario and that most tasks were responded to. Participants did not respond to all tasks. The authors feel this was due to a lack of work stations available to the controllers to monitor the game. Facilitators planned breaks at 1.5-hr intervals to allow controllers to review progress.

After the first scenario, the controllers noted that some organizations were tasking oriented and were relying on specific direction to take any action. This required the controllers to add events to

DCSOPS - Activate additional units?
Coordination: DCSFM, DCSLOG, DCSPER, DCSSD, OAM, DCSRM (see glossary for organizational names)
New actions:

DCSOPS - Request DCSFM verify the possibility of activating additional units to augment the network as the C4I assets are stretched. {#43, 3/11/96, 9:01 AM}

DCSOPS - The DCSLOG needs to verify transportation resources for the deployment of the newly activated units. {#44, 3/11/96, 9:01 AM}

DCSOPS - The DCSPER needs to assist new units with personnel fill requirements. {#45, 3/11/96, 9:01 AM}

DCSOPS - DCSSD needs to determine need for COTS to equip the units. OAM, contracting, please assist. RM take care of financing. {#46, 3/11/96, 9:01 AM}

RM - We will stay in touch for cost/risk benefit analysis issues. {#47, 3/11/96, 9:01 AM}

OAM - We need a possible list of COTS items. This will allow contracting to conduct a market survey and have vendors on line to fill requirements. I cannot make commitments until the money is available. {#48, 3/11/96, 9:01 AM}

DCSLOG - Transportation resources are very limited especially the airlift assets. Signal assets that have not already been identified for theater deployment will need to be identified early on, particularly if they have not been TPFDD. {#49, 3/11/96, 9:01 AM}

RM - We need a ball-park estimate in order to work resources. {#50, 3/11/96, 9:01 AM}

DCSPER - We are ready to assist the activated unit with added personnel to bring them as close as possible to 100% fill. {#51, 3/11/96, 9:01 AM}

Figure 1. Scenario 1.

prompt those directorates to participate. We show a typical task generated by the controllers in Figure 2. The Chief of Staff (CofS) identifies tasks created by the controllers to prompt the tasking oriented directorates to take needed actions.

4.3.3 Quality and Quantity of Scenario Tasks. As seen in Figures 1 and 2, the play was very free format. The quality and quantity of information often depended upon the individual participants. The controllers were directed to review activities for their reasonableness. Also, the game was very high level, so specifics about communications towers, units, responding, and such were usually left out.

Scenario 2 Battle Tasks

1. CofS: Earthquake collapses fixed satellite station.

Coordination: DCSENGR, OAM, DCSLOG

New Actions: DCSOPS, ISEC

DCSENGR - We are requesting a signal engineer to evaluate structural damage and estimate cost of repairs. DCSOPS suggest ISEC evaluate equipment damage and replacement/installation. {#53, 3/11/96, 9:03 AM}

DCSOPS - Request ISEC provide an evaluation team (SATCOM expertise necessary) to fly to disaster area and be on standby for deployment instructions. {#54, 3/11/96, 9:04 AM}

DCSENGR - Signal engineer reports the foundation has split. The DCSENGR declares the structure unusable. Request from DCSOPS a mobile communications van until the Corps of Engineers can get a new structure built. {#55, 3/11/96, 9:05 AM}

DCSOPS - Have tasked the Signal Brigade to provide a TSC-86 until repairs are complete on the GSC-52 antenna. Estimated shipping time is 2–3 days. DCSLOG needs to coordinate shipping arrangements. DCSRM needs to have the shipping fund site ready to provide to Brigade. {#56, 3/11/96, 9:07 AM}

Figure 2. Scenario 2.

However, one clever individual decided to make his own job easier by stating that the Barnum and Baily Circus was in the war zone, and he was able to use their tents. This enabled his existing tasks, but the controllers then forced him to deal with the contracting and resource management participants in order to pay for this windfall he had created.

Although the game consisted of both small and large elements of the command, the best play was from the participants who were full-time, proactive, and knew the overall nature of their directorate. Larger directorates (100 or more) were at a disadvantage, because very few individuals knew the detailed activities and were often called upon to answer questions in unfamiliar areas. However, a proactive participant usually would call in assistants from their directorate to review certain situations and respond accordingly.

After participants completed the scenarios, the facilitators made a rough count of participation. In all there were over 225 scenario tasks and over 600 comments within those tasks. Approximately one of every two tasks within the scenario needed DCSOPS coordination or action. Further, most

elements, even small elements such as the Public Affairs Office, were involved in 10–20% of the actions. Some activities also clarified who was responsible for the action and who was not.

4.4 Match of Actions/Activities to METLs. Once the scenarios were played, the facilitators grouped all the battle tasks by directorates. We placed each scenario task specifically made by the directorate in their METL bucket, along with any task that identified them for coordination on the task. We then brought each directorate up in their own Categorizer session and allowed them to subdivide the tasks into individual METLs. This allowed the directorates to see which METLs were played and which were not, and which scenario tasks were performed that did not have a corresponding METL.

4.5 Match of Directorate METLs to ISC METLs. After the directorates reworked their METLs, they then matched their METLs to the ISC METLs. The participants proposed two new ISC METLs. The CG ISC later reviewed the proposed METLs.

One of the command mission essential tasks dealt with networks and was a good example of where improvement was needed based on the war game. It originally had few "battle tasks." During the review, the expert from the network area reviewed the METLs from other areas and determined what was missing from the METL for networks. The exercise leaders requested input from several directorates based on this review.

4.6 Evaluations. The evaluation consisted of daily Topic Commentor sessions with questions about administration, scenario, and game play conventions. The controllers reviewed the evaluations each evening and provided feedback to the participants in the morning. Exercise leaders made several helpful adjustments to the game based on participant recommendations. The final evaluation at the end had a vote concerning things like:

- How well qualified did the participants feel they were to represent their directorate?

- Did they have enough time to complete their tasks?
- Did they have enough help from their directorate?
- Etc.

In most of these areas, the group split between those that were properly prepared for the game and others that were notified at the last minute.

Key Point: Exercise leaders need to inform participants well ahead of the game that they are the directorate representative and given time to prepare.

4.7 Results and Outbriefing. At the end of the week, both the exercise leaders and the facilitators briefed the DCSOPS and ISC Commander. The exercise leader gave all participants copies of their materials to assist in reworking their mission essential tasks and battle tasks.

According to both participants and game controllers, the exercise identified needed changes to directorate METLs and battle tasks for several directorates. The exercise also validated that the existing ISC METLs were relatively sound under a major regional conflict scenario. The changes the participants made in the METLs mainly involved additions to the METLs to accommodate scenario situations that occurred but were not accounted for in the original METL. One of the directorates felt they now needed to rework the relationships between the mission essential tasks and the battle tasks.

The staff exercise gave the ISC staff opportunity to see how their METLs fit into the big picture. The exercise allowed the participants to see what other directorates would do in times of conflict and how their own directorate would interact with the soldiers in the field and the other directorates. The exercise made the amount of interaction and the detail of the interaction needed for certain tasks visible to the participants. For example, approximately one of every two tasks within the command will need DCSOPS coordination or action. Further, the exercise showed that most elements, even

small elements such as the Public Affairs Office, were involved in 10–20% of the actions. It also showed where some organizations were tasking oriented and were relying on specific direction to take any action.

4.8 Game Methodology. Although the facilitator team had experience with Army simulation war games, the basic methodology was modeled after both commercial role playing games and those used for strategic level classroom exercises. In these games, facilitators give individuals a position in the game, a starting situation, and then ask the participants to respond and interact accordingly. Exercise leaders gave the controllers the following guidelines:

- Give the participants the basic constraints of their role. (In this case, most participants knew the responsibilities of their directorates.)

- Ensure that the participants have something to respond to and were responding to requests from others.

- Respond to participant questions, be reasonable, and allow creativity.

The disadvantage for the controllers in performing these tasks was their lack of access to the game through dedicated work stations.

4.9 Comparisons With Typical Simulations. In most familiar simulations, detailed models are created and include models of specific units, equipment, and communications capabilities. This exercise did not have these features of a highly complex simulation. There was no provision for information over time, such as a discrete event simulation game with events occurring every hour. In this exercise, the participants were concerned only with high level events. The participants were to respond to whatever they felt their directorate would be doing during the scenario.

5. Suggestions for Improvement

The following are some suggestions for improvement for future exercises. Most of the suggestions apply to the gaming usage for exercises.

5.1 Top Management Support for the Exercise. Although the staff war game was well advertised and described, management should be at least a part-time participant or be brought in at the end of each scenario. As stated earlier, several participants were not familiar with all aspects of their directorate. Therefore, having their management involved in the play of the game would allow management oversight of the actions taken.

5.2 Directorate Participation. As stated earlier, there was both good and poor participation in the exercise. Part of the poor participation could be blamed on the "newness" of this staff exercise. The poor participation showed in three different ways.

- **Lack of Full-Time Participation.** Lack of full-time participation limited both what the directorate could do of their own task responsibilities and the effectiveness of other directorates in the exercise. This was particularly critical when participants did not get responses to their requests for coordination with a directorate that was not available.

- **Selection of Inappropriate Representatives.** These included individuals who were new in the job or so low in the command structure as to preclude a directorate-wide perspective in responding to the scenarios.

- **Selection of a Reactive Rather Than a Proactive Representative.** These individuals insisted on only responding to tasks created by others rather than independently entering what they would need to do under the scenarios.

Good participation was shown by directorates with full-time representation in the exercise by someone who had sufficient knowledge of the directorate to act proactively in the exercise. To increase the probability of creating a good directorate command cell, the exercise owner should make sure each directorate knows what is expected of them in the game.

5.3 Equipment for All Participants. In retrospect, several additional work stations were needed. Although work station sharing was easy to accommodate, in the future it is recommended that a station be available for:

- Each directorate
- Exercise leader/facilitator
- Red team members (1–2)
- Commander
- Controllers (1–2)
- More than one participant from certain directorates.

5.4 Controller Support Requirements. Controllers' involvement could be improved in two ways. First, directorates were often changing their key participants, requiring instruction in the mechanics of the electronic meeting software and in the context of how the software was being used in the game. The controllers thus had to train the new participants and did not always know how their predecessors had been participating. This uncertainty would be lessened by experience, and also by more full-time participants. Second, there were few times when any work station was not being used. It would have been very helpful to have a dedicated station available for the controllers to use to monitor the inputs.

5.5 Game Planning. With recent upgrades to the local network, it is now feasible to use the electronic meeting software in a distributed mode—and not just in a room environment. In this

manner, for any exercise, all participants could enter their respective portions of the exercise planning as needed, along with questions and problems. This could supplement or even replace a large number of coordination e-mail.

5.6 Game Procedures. The original design of the interaction of the game used an in-box concept as described earlier. The facilitators found this design unusable during play-testing the week before the war game. The game design was simplified for the actual war game.

Key Point: Test the game mechanics with the controllers before the actual game starts.

5.7 Techniques in Use of Group Systems for Windows. Group Systems for Windows is a fairly simple program to learn to use, but quite diverse in its application. We learned several technique lessons concerning the software.

Session Organization. The staff war game employed multiple meeting sessions, several activities within those sessions, and many categories within the activities. The complexity confused both the participants and the facilitator team. In retrospect, it would have been easier to lump all scenarios in one activity and have only one category for each scenario.

Key Point: If one creates many sessions, activities, and categories, there is probably an easier way of doing it.

Anonymity. One of Group Systems for Window's strong points is anonymity. The staff war game was the kind of exercise that did not need anonymity. During the game, the facilitators required the participants to "sign" their entries. In the future, subgroup identification should be used to reduce the amount of keying required for each action. The downside of this is that each time the organization changed at a particular station, a logout and login would be required with an action required from the technographer to start the new individual in the activity.

System Timing. One nice feature of Group Systems for Windows is that any comment that has not been seen by the participant's work station is flagged in red. This allows participants to know when additional information is added. One quirk with using Group Systems for Windows on NT was that the date and time used by Group Systems for Windows was the one on the participant's work station. On one machine, the red flags were continually being shown even when the participant knew he had "seen" the item. For participants not familiar with the system, this caused a loss of trust in the system. (The difficulty was that the time on the offending work station had been set to the right day and time but the wrong year.)

6. Future Applications

Electronic meeting computing has been recognized by industry as an emerging productive technology. Currently, versions of Group Systems for Windows and other collaborative software are under development to allow easy use over Wide Area Networks (WANs) and with the Worldwide WEB. The following paragraphs represent both specific and general suggestions for use of electronic meeting computing to the Army.

6.1 Army Signal Command and Headquarters, U.S. Army Forces Command (FORSCOM). During the past year, the Signal and Information Systems resources of the Army have undergone considerable study for reorganization and realignment. The result is the Army Signal Command (ASC) with a more operational focus reporting to FORSCOM HQ, Fort McPherson, GA.

The ARL staff based in Atlanta, GA, is willing to support another use of the electronic meeting software for war gaming purposes. We suggest that the new war game involve the major organizations from the new ASC and FORSCOM HQ to identify how they would operate in this new organizational structure.

However, to adequately play this war game, many preplanning issues would need to be resolved, such as commander's intent, location, participants, threat scenario, and logistics.

For example, approximately 25 stations would be needed, preferably in an unclassified environment. Each major organization element such as DCSOPS, DCSPER, DCSLOG, and DCSRM (or G1, G2, G8) would have at least one work station. Several elements such as DCSOPS may wish to have a work station for each of their subelements. The infrastructure would need one facilitator station, two–three controller/threat stations, and one commander's station.

The new Army Signal Command begins operation at the beginning of FY97 and therefore the suggested time frame is sometime thereafter. This war game exercise would help identify problem areas before the problems surface at a crucial moment during a contingency. It would also identify areas of opportunity to organize and function in new and innovative ways.

Depending upon the FORSCOM or ASC Commander's intent, this game could be played in Fort Huachuca, AZ, or at Fort McPherson, GA, FORSCOM HQ. Depending upon the release of technology innovations in the WAN versions, this game might be able to be played in both locations simultaneously.

6.2 Other Uses Within the Information Systems Command. Many specific suggestions for use of electronic meeting software were given during the evaluation sessions and were grouped into these generic areas:

- Preparation of planning documents such as organizational and operational (O&O) plans and military operational plans (OPLANs).

- Development and staffing of regulations and similar policy documents.

- Working groups—especially those dealing with reorganizations and realignments.

With the improvements in the Fort Huachuca network infrastructure and the creation of the Collaborative Computing Laboratory in the Technology Integration Center, all these uses and others are feasible today within the ISC community at Fort Huachuca, AZ. Feedback from these and other applications of electronic meeting software within the ISC community, typical industry productivity improvements of four to one across time, quality, and quantity factors would be highly realistic.

6.3 Future Army Exercises. Most Army exercises are planned many months, and in some cases years, in advance with various staffs and individuals around the world. With the ability to have distributed meetings over WANs and the WEB, electronic meeting software could be used as a central repository for plans, issues, and developments—both before, during, and after the exercise.

6.4 Evaluating Organizational Proposals. The current trend in downsizing and business process reengineering is causing a number of reorganizations within the Army and the rest of the Federal Government. Too often, it is not known if the new organization will adequately support the existing needs of their customers effectively. However, the gaming use of electronic meeting software allows groups to actually "breadboard" the new organization against scenarios of day-to-day business events. This would allow managers to "try-out" various organizational realignments before actual implementation.

6.5 Training. Another use of the gaming application would be as a modern day version of the in-box exercise described earlier. By arranging the activities of the electronic meeting software, a model of the existing work flow and structure of the organization could be developed. This could allow new employees to get a feel for organizational processes before they actually started working. These exercises were envisioned to include these characteristics:

- Small (1 hr)
- Focused on specific duties or specialties
- Derived from real-world situations.

6.6 Research Area. One typical outcome of electronic meetings is the creation of a large amount of material from the participants. Although the electronic meeting software has several tools that help participants distill this information, situations have developed in other meetings where no one person understands the entire volume of information being produced.

In this light, the staff war game produced a large amount of data (over 225 activities and hundreds of associated comments). Other than some rough grouping of scenario tasks by organization, the analysis of the content of the game was left to the individual organizations.

However, with some structuring of the information, this type of information may be amenable to analysis by tools such as text visualization, artificial intelligence, or records management tools. Specifically, with some adaptation, the XZY tool from the National Security Agency could provide a graphic representation of the interaction of the various staff elements by representing each staff element as a node and volume of interaction between nodes as weighted or colored links. From a commander's viewpoint, this analysis could lead to better input for communication need lines and bandwidth requirements.

This research could lead to a suite of generic tools that would allow easy analysis of the large amount of data generated during an electronic meeting (both face-to-face and distributed).

7. Conclusions

Electronic meeting software was shown to be a useful and valuable tool for certain types of Army exercises, both in preplanning, execution, and after-action reporting and should be considered for use in other exercises. The use of electronic meeting software for gaming of a staff war game was a relatively inexpensive, simple, and effective way of analyzing staff and organizational interactions. With the forthcoming ability to operate these situations over distributed environments, it has large potential for other gaming situations, organizational analysis, and work flow simulation—both military and commercial.

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Glossary of Acronyms and Organizational Names

311th	311th Signal Command, Delaware National Guard
AAR	After-Action Report
ARL	U.S. Army Research Laboratory
ASC	Army Signal Command—successor command to ISC
C4I	Command, Control, Communications, Computers, and Intelligence
CofS	Chief of Staff, ISC
DCSENGR	Deputy Chief of Staff for Engineering, ISC
DCSFM	Deputy Chief of Staff for Financial Management, ISC
DCSLOG	Deputy Chief of Staff for Logistics, ISC
DCSOPS	Deputy Chief of Staff for Operations and Plans, ISC
DCSPER	Deputy Chief of Staff for Personnel, ISC
DCSRM	Deputy Chief of Staff for Resource Management, ISC
DCSSD	Deputy Chief of Staff for System Development, ISC
EMS	Electronic Meeting Software
FORSCOM	U.S. Army Forces Command
GDSS	Group Decision Software Support
ISC	Information Systems Command
ISEC	Information Systems Engineering Command (Subordinate element of ISC)
METL	Mission Essential Task List
NCO	Noncommissioned Officer
O&O	Organizational and Operational
OAM	Office of Acquisition Management
OPLAN	Operational Plan
TPA	Technical Program Annex—Formal agreement between ARL and ISC regarding support
TPFDD	Time-Phased Force Deployment Data
USAR	U.S. Army Reserve
WAN	Wide Area Network

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13. ABSTRACT ***(Maximum 200 words)***

This report describes the use of an electronic meeting software system by the U.S. Army Research Laboratory (ARL) to assist the Information Systems Command (ISC) in three Grecian Firebolt exercises in February and June 1996.

This use of the electronic meeting software was valuable to the exercise leader in preplanning, execution, and after-action reporting for the exercises and to the ISC staff in the staff exercise supporting Grecian Firebolt. In this latter use, the electronic meeting software was an inexpensive, simple, and effective way of analyzing staff and organizational interactions.

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